

ANALYSIS OF VARIANCE FOR DIFFERENT CHARACTERS IN MUSTARD (*BRASSICA JUNCEA*) TO IMPROVE THE YIELD FOR AGRICULTURE DEVELOPMENT

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ABSTRACT

Brassica is a common oilseed crop in India. The demand of Brassica in India as well as other country increase day by day. The present study concern with Quantitative traits for analysis of variance. The result of the study indicates that the mean squire of traits were highly significant. This study involve traits like Flowering time, time of maturity of plant, height of plant, number of primary branches, number of secondary branches, Pods number, 100 seed weight, biological yield, harvest index seed yield per plant. The quantitative variance of selected traits shows significant value as shown in the result. Hence the study is beneficial to agriculture and help to the growth of farmers by producing high yields.

KEY WORDS: Agriculture, Brassica, Traits & Yield

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INTRODUCTION

The Brassica Juncea follows the amphidiploids nature of species. The wild species of Brassica Juncea is found in the East and South region of Iran. Gnotypically, it has $n = 18$ number of chromosomes. It formed by the cross between two species as Brassica *nigra* and Brassica *rapa*. The genotype of both Brassica species is $n = 9$ for B. *nigra* and $n = 10$ by B. *rapa*. In India, it grows as an oilseed plant and is commonly known as Indian Mustard or brown mustard. In other countries like China, it grows as a leaf vegetable used in green food as well as in oil. In China, seed color of Brassica Juncea are yellow seeded but in India, it is found a brown seed.

PRODUCTION AT WORLD LEVEL

Over the world, the production of Brassica is increased rapidly to control the artificial synthesis of oil. In India, Brassica is produced at a high level. Other countries like China and Canada also cultivate the oilseed plant of Brassica. The highest seed production is found in China and Canada but the Highest cultivation is found in Europe. The weather conditions of Europe support the production rate. The specific Brassica *napus* cultivated in Europe. E.V. Divakara Sastry (2003) Reported that Taramira seed crop used to mix the oil in *Brassica campestris*. It has only $2n = 22$ chromosomes and it decreases resistance of disease.

Kimber and Mc Cregor 1995 say that Canada and Australia play the role of Exporter and Japan and China as importer.

Though it is important crops, its area production and productivity decline day by day in our country. The

main reasons for the decline are:

- Lack of improved varieties and low genetic base.
- Preference of other crops by farmers over linseed, such as wheat, maize, potato other oil crops.
- The cultivation in rain fed condition.
- Use of insufficient fertilizers and pesticides

Hence to broaden the genetic base and production of improved varieties the research works should be promoted. On the basis of the above points, our study is helpful to greater production and improves the quality of the crop. The phenotypic traits of crops help to select the genotype of the plant which help to understand the nature of heredity of traits. Heritability estimates help in deciding the selection intensity, whereas the genetic advance predicts the grain likely to be achieved in the next generation. Correlation of the traits and production of Yield is very important for study.

The present investigation has been taken with the following objectives:

- Evaluation of different cultivars of mustard
- Estimation of variance, Inherited nature of traits, among different characters.
- To find out suitable parents for further mustard breeding.

MATERIALS AND METHODS

For study of selected traits of Brassica, the methods were applied as

1. Experimental Design

The trial of selected crop was grown at Crop Research Farm Post Graduate College Ghazipur during *Rabi* during the year 2008-2009. We choose random block design for culture of selected crop. During seeding the seed, the distance maintained between rows is 45 cm and distance between plants is 25 cm. The total length of the plot is 3m long. There was three row of each variety were sown.

- **Selection of Traits:** We apply random method for plant selection for study.
- **Selection of time for 50 flowering :**
This was select in days and counted after showing time.
- **Days of maturity :**
There was selected for physiological maturity of plant and counted till sowing.
- **Height of Plant:** it measures from ground to apex region of plant.
- **Primary branches number per plant:** during maturity we count number of primary branches.
- **Secondary branches per plant:** The total number of secondary branches was counted on the primary branches.
- **Number of Pods per plant:** The seed bearing pods was counted on selected plant for study.
- **Pod length (cm)**

It was measured in centimeter.

- **Number of seeds per pods:** Randomly 5 pods were selected for seed count and count the average number.
- **Seed Weight (100) gm:** there are select 100 seeds randomly from selected plants with the help of electronic balance.
- **Biological Yield (g)**

Plants at maturity were harvest separately. They were dried in sun and the weight of whole plant was taken using electronic balance.

- **Harvest index (%)**: It is the ratio of biological yield and economic yields. It is expressed in Percentage value. Donald 1962 gives that seed yield was divided by biological yield of plants and after multiplying by 100. It was measured as :

$$HI = \frac{\text{Seed yield}}{\text{Biological yield}} \times 100$$

- **Yield of seeds per plant:** The selected plant seed weigh by the help of electronic balance in gram up to two decimal points was taken then average weight was calculated.

STATISTICAL ANALYSIS

Variance analysis: The genotypic mean value of each replicate used for statistical analysis. The selected data were analysis's for test the significance. It is the difference between genotype of selected characters. We apply the following as analysis of variance as given by Panse and Sukhatme 1967 method.

RESULTS AND DISCUSSIONS

The Present result indicates the findings after calculating the mean value as as

50 Flowering Days

The mean value of the traits was found as 60.79 days which ranged from 56.00 to 65.67 days. Genotype PGCM~5 was the earliest to flowering while PGCM-14 was the latest to flower PGCM-1 flowered in 61.00 days followed by PGCM-3 (56.40 days), PGCM-11 (58.33 days), PGCM-7(58.73 days), PGCM-12(59.13 days) and PGCM-1 (60.03) days.

Genotype PGCM-14(65.67days) for following the other late flowering genotype were PGCM-15(64.60 days), PFCM-4(62.60 days), PGCM-8(62.53 days), PGCM-6(62.47 days), PGCM-13(62.33 days) and PGCM-10(62.00 days). Richa Bharti et al (2019) organize an experiment on Indian mustard and conclude on Genotypic architecture of Brassica and suggested that various hybrid species of plant produce on the basis of phenotypic traits.

Maturity Days

The value of mean of the traits was recorded as 118.16 which ranged from 115.33 to 121.00 days. The Genotype PGCM-14(115.33 days), PGCM- 4(115.67 days), PGCM-13(116.67 days) and PGCM-2(116.93 days) were observed as early maturity genotypes. Similarly, the genotype PGCM- 3(121.00 days) was recorded as a late maturity genotype. M.A. Malek (2012) Stated that after treatment of mustard seeds by gamma radiation and grow these mutated seeds than compare to their

mother variety for high yield of mustard seed.

Height of Plant (cm)

The mean value of plant height as 144.6 cm which ranged from 141.6 to 154.27cm. The maximum plant height was recorded in genotype PGCM-9 (154.27cm) followed by PGCM-10 (145.40 cm.), PGCM-11 (145.10cm), PGCM-11 (145.27 cm) and PGCM-7(145.13 cm). we observe similar plant height in genotype PGCM-4 (141.60 cm) followed by PGCM-2 (142.73 cm), PGCM-1 (143.27 cm), PGCM-6 (143.33 cm) and PGCM-14(143.67cm),

Primary Branches Number per Plant

The selected primary branches traits were 5.57 and range was 4.00 to 6.67. There was Genotype PGCM-15 contained the highest number of primary branches (6.67) followed by PGCM-13 (6.47), PGCM-10 (6.33), and PGCM-11 (6.20). A similar result of the minimum number of primary branches of genotype PGCM-5 (4.00) followed by genotype PGCM-1 (4.87), PGCM-7(4.93), PGCM-3(5.07) and PGCM-9 (5.13).

Secondary Branches Number per Plant

The mean value of secondary branches was 9.06 and which ranged from 7.87 to 10.80. Genotype PGCM-5 produced we find the maximum number of secondary branches/plant (10.80) same as PGCM-4 (10.47), PGCM-6 (10.47), PGCM-1 (10.13) and PGCM-8(9.07). The minimum number were found in the genotype PGCM-3 (7.87) similar to genotype PGCM-2(7.93), PGCM-9 (8.13), PGCM-14(8.40) and PGCM-15(8.70).

Pod Number

The general mean of pod recorded was 459.90 which ranged from 445.47- 476.67. Genotype PGCM-10 produced the maximum number of pod (473.67) followed by PGCM-13(467.33), PGCM-5(466.33), PGCM-9 (465.60) and PGCM-8 (464.67). But the lowest number of pod was found in genotype PGCM-12 (445.47) followed by PGCM-7 (451.40), PGCM-4(452.00), PGCM-3(453.0) and PGCM-6 (454.67).

Pod Length

The general mean of pod length was 4.67 which ranged from 4.27 to 5.35. Genotype PGCM-4 produced the maximum pod length (5.35) followed by genotype PGCM-13(5.13), PGCM-3 (4.99), PGCM- 14 (4.98) and PGCM-2 (4.79). The minimum pod length was found in genotype PGCM-7 (4.27) followed by PGCM-6 (4.35)" PGCM-12 (4.37), PGCM-8 (4.41) and PGCM-9 (4.43). H. S. Meena *et al* (2015) suggested that after cross between parental and F1 hybrids and evaluate with RCBD with 3 replicate of Indian mustered for high yield of oilseed mustered plant.

Number of Seeds Per Pod

We found in our result that number of seeds was 9.22 which ranged from 8.53 to 9.80. Genotype PGCM-10 produced the maximum number of seeds /pod (9.80) followed by genotype PGCM-7(9.47), PGCM-12 (9.46), PGCM-6(9.33) and PGCM-15(9.33). But our result indicates that the minimum seeds per pod was found in genotype PGCM-9(8.53) followed by PGCM-14(9.00), PGCM-5 (9.01), PGCM-2 (9.13) and PGCM-11(9.13).

Weight of 100 –Seeds

The general mean of 100-seeds weight was 0.33g which ranged from 0.25 to 0.39 g. Genotype pcm-15 produced the maximum 100 seeds weight (0.39 g) followed by genotype PGCM-14(0.38g),PGCM- 1(0.36 g), PGCM-4(0.36 g) and

PGCM-8(0.35 g). The minimum 100 seeds weight was found in genotype PGCM-2(0.25g) followed by genotype PGCM-3(0.28 g), PGCM-5(0.28 g), PGCM-7(0.28 g) and PGCM-13(0.29 g).

Biological Yield per Plant

The range of traits was found in our observation as 65.41 to 87.00 g and the general mean was 78.32 g. There was a highest biological yield per plant observed in genotype PGCM-2 (87.00g) similar as genotype PGCM-14 (86.20g), PGCM-4 (85.47g), PGCM-1(85.40g) and PGCM-6(76.53 g). There was lowest biological yield per plant was observed in genotype PGCM-3(65.41 g). **V.Vinu et al (2013)** conclude that after cross of exotic and indigenous species of Brassica, found hybrid variety that is useful to the Indian scenario.

Yield of Seed per Plant

In our result, the yield per plant was observed as 13.02g which ranged from 10.92 to 14.83 g. There was maximum yield reported in genotype PGCM-13(14.83 g) similar to PGCM-2(14.13 g), PGCM-12(14.03 g), PGCM-4(13.78 g) and PGCM-7(13.75g). But minimum seed yield per plant was reported in genotype PGCM-5(10.92g) same as PGCM-10(11.37 g), PGCM-8(11.53 g), PGCM-1 (12.10 g) and PGCM-6 (12.12g). **D K Yadava et al (2011)** studied on Indian variety of Brassica species during winter and rainfed environment and calculated quantitative variance of 14 traits.

Harvest Index

This character ranged from 13.59 to 25.81 and the general mean was 20.78. The maximum harvest index was recorded in the genotype PGCM-14(25.81) followed by genotype PGCM-1(24.37), PGCM-10 (24.08), PGCM-9(23.12) and PGCM-6(22.36). The minimum harvest index was found in genotype PGCM-13(13.59) followed by genotype PGCM-2(15.81), PGCM-7(16.88), PGCM-8(18.75) and PGCM-4(19.47). **Muhammad Arifullah et al (2012)** indicate the general combination ability of most of the traits except plant height and silique length was significantly ability in *Brassica Juncea*. **Devmani Bind et al (2015)** Noticed the genetic diversity of thirty Brassica genotype with the help of Mahalanobis D2 statistics.

CONCLUSIONS

The present investigation indicates the higher performance of above considering yield contributing traits give better seed yield and desirable combination have resulted due to simultaneous selection for these characters in mustard. Our study is helpful to reduce the demand for oilseed plant in India as well as other countries of the world.

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Table 1: Analysis of Variance for Different Character in Mustard (*Brassica Juncea*)

Variation Source	df	50% Flowering Days	Maturity Days	Height (cm)	Primary Branch Number	Sec.branch Number	Pods per Plant	Length of Pods	Per Pods Seeds	Weight 100 Seeds	Biol. Yield	HV Index	Per Plant Seed Yield
Replication	2	0.550	4.050	4.059	1.368	2.073	16.512	0.088	0.074	0.0004	13.538	1.627	8.474
treatment	14	24.419**	7.689**	24.736**	1.543	2.732**	179.369**	0.302**	0.228*	0.0054**	106.982**	33.769**	3.996**
Error	28	0.618	2.196	3.1291	0.418	0.539	10.631	0.100	0.098	0.0002	4.934	1.413	1.013

